

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing: 25 January 2001 (25.01.01)	
International application No.: PCT/GB00/01582	Applicant's or agent's file reference: SEM/52691001
International filing date: 25 April 2000 (25.04.00)	Priority date: 23 April 1999 (23.04.99)
Applicant: MOSIER, Paul	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International preliminary Examining Authority on:
13 October 2000 (13.10.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer: J. Zahra Telephone No.: (41-22) 338.83.38
---	---

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

BOULT WADE TENNANT
Verulam Gardens
70 Gray's Inn Road
London WC1X 8BT
GRANDE BRETAGNE

06 AUG 2001

BOULT WADE TENNANT

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing
(day/month/year) 02.08.2001

Applicant's or agent's file reference
SEM/52691001

IMPORTANT NOTIFICATION

International application No.
PCT/GB00/01582

International filing date (day/month/year)
25/04/2000

Priority date (day/month/year)
23/04/1999

Applicant
ELLIOTT INDUSTRIES LIMITED et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

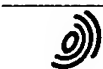
4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

Dolezel, A

Tel. +49 89 2399-2940



PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

BOULT WADE TENNANT
Verulam Gardens
70 Gray's Inn Road
London WC1X 8BT
GRANDE BRETAGNE

PCT

WRITTEN OPINION

(PCT Rule 66)

		Date of mailing (day/month/year) 07.02.2001	
Applicant's or agent's file reference SEM/52691001		REPLY DUE within 3 month(s) from the above date of mailing	
International application No. PCT/GB00/01582	International filing date (day/month/year) 25/04/2000	Priority date (day/month/year) 23/04/1999	
International Patent Classification (IPC) or both national classification and IPC B24D13/16			
Applicant ELLIOTT INDUSTRIES LIMITED et al.			

1. This written opinion is the first drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain document cited
 - VII ☒ Certain defects in the international application
 - VIII ☒ Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.


Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the International preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: **23/08/2001**.

12 FEB 2001

BOULT WADE

Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer / Examiner Antoniadis, F <hr/> Formalities officer (incl. extension of time limits) Dolezel, A Telephone No. +49 89 2399 2940
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WRITTEN OPINION

International application No. PCT/GB00/01582

I. Basis of the opinion

1. This opinion has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".*):

Description, pages:

1-12 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement
- | | | |
|-------------------------------|--------|-----|
| Novelty (N) | Claims | 1,2 |
| Inventive step (IS) | Claims | |
| Industrial applicability (IA) | Claims | |

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The nearest prior art for the subject-matter of claim 1 is described in US-A-4 961 807. This document describes all features of claims 1 and 2 (see US-A-4 961 807, figures 8-10 and 15-20). The subject-matter of claims 1 and 2 is therefore not novel (Art. 33(2) PCT).

Dependent claims 4-11 do not appear to contain any additional features which, in combination with the features of claim 1 would involve an inventive step.

It is not at present apparent which part of the application could serve as a basis for a new claim meeting the requirements of Art. 33 PCT. Should the applicant nevertheless regard some particular matter as patentable, an independent claim should be filed.

The applicant should also indicate in the letter of reply the difference of the subject-matter of the new claim vis-à-vis the state of the art and the significance thereof.

Re Item VII

Certain defects in the international application

The independent claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document US-A-4 961 807) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

The independent claims should therefore be redrafted accordingly.

The features of the claims should be provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

According to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document US-A-4 961 807 should be discussed in the description.

Re Item VIII

Certain observations on the international application

Claims 1 and 12 do not meet the requirements of Art. 6 PCT, because their subject-matter is not clear.

In particular the expressions "lowermost edge" in claim 1 and "upper surface" in claim 12 are not clear.

Further the essential feature that the backing plate is disc shaped should be introduced in claims 1 and 12.

The expression " lowermost edge" in claim 1 should be replaced by "radial edge".

Finally the wording of claim 1 should be amended in order to differ the claim from the abrasive disk of document FR-A-2 127 897, fig.1, 4, 8A.



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FAX +49 89 2399-4465

**Europäisches
Patentamt**

Generaldirektion 2

**European
Patent Office**

Directorate General 2

**Office européen
des brevets**

Direction Générale 2

Correspondence with the EPO on PCT Chapter II demands

In order to ensure that your PCT Chapter II demand is dealt with as promptly as possible you are requested to use the enclosed self-adhesive labels with any correspondence relating to the demand sent to the Munich Office.

One of these labels should be affixed to a prominent place in the upper part of the letter or form etc. which you are filing.

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) SEM/52691001

Box No. I TITLE OF INVENTION

IMPROVEMENTS IN OR RELATING TO ABRASIVE FLAP DISCS

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

ELLIOTT INDUSTRIES LIMITED
ELLIOTT HOUSE
VICTORIA ROAD
LONDON
NW10 6NY
UNITED KINGDOM

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:
UNITED KINGDOM

State (that is, country) of residence:
UNITED KINGDOM

This person is applicant
for the purposes of:

☐ all designated
States

☒ all designated States except
the United States of America

☐ the United States
of America only

☐ the States indicated in
the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

MOSIER, PAUL
17 LEICESTER ROAD
MEASHAM
SWADLINCOTE
DERBYSHIRE, DE12 7JG
UNITED KINGDOM

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box
is marked, do not fill in below.)

State (that is, country) of nationality:
UNITED KINGDOM

State (that is, country) of residence:
UNITED KINGDOM

This person is applicant
for the purposes of:

☐ all designated
States

☐ all designated States except
the United States of America

☒ the United States
of America only

☐ the States indicated in
the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf
of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

BOULT WADE TENNANT
VERULAM GARDENS
70 GRAY'S INN ROAD
LONDON WC1X 8BT
UNITED KINGDOM

Telephone No.

+44 (0)20 7430 7500

Facsimile No.

+44 (0)20 7831 1768

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|---|--|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LR Liberia |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MA Morocco |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CR Costa Rica | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> DM Dominica | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> IS Iceland | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> ZA South Africa |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet: |
| <input checked="" type="checkbox"/> KR Republic of Korea | <input checked="" type="checkbox"/> DZ Algeria |
| <input checked="" type="checkbox"/> KZ Kazakhstan | <input checked="" type="checkbox"/> AG Antigua & Barbuda |
| <input checked="" type="checkbox"/> LC Saint Lucia | |
| <input checked="" type="checkbox"/> LK Sri Lanka | |

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application:* regional Office	international application: receiving Office
item (1) 23 April 1999	9909468.2	U.K.		
item (2)				
item (3)				
<input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):				
<small>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</small>				
Box No. VII INTERNATIONAL SEARCHING AUTHORITY				
Choice of International Searching Authority (ISA) <small>(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):</small>		Request to use results of earlier search; reference to that search <small>(if an earlier search has been carried out by or requested from the International Searching Authority):</small>		
ISA /		Date (day/month/year)	Number	Country (or regional Office)
Box No. VIII CHECK LIST; LANGUAGE OF FILING				
This international application contains the following number of sheets: request : 43 description (excluding sequence listing part) : 12 claims : 4 abstract : 1 drawings : 3 sequence listing part of description : Total number of sheets : 24		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input checked="" type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input checked="" type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):		
Figure of the drawings which should accompany the abstract: 3		Language of filing of the international application: ENGLISH		
Box No. IX SIGNATURE OF APPLICANT OR AGENT				
<small>Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).</small>				
BOULT WADE TENNANT _____				

For receiving Office use only		2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received:
1. Date of actual receipt of the purported international application:		
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		
4. Date of timely receipt of the required corrections under PCT Article 11(2):		
5. International Searching Authority (if two or more are competent): ISA /		6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

For International Bureau use only	
Date of receipt of the record copy by the International Bureau:	

This sheet is not part of and does not count as a sheet of the international application.

PCT

FEE CALCULATION SHEET Annex to the Request

For receiving Office use only

International application No.

Date stamp of the receiving Office

Applicant's or agent's
file reference SEM/52691/001

Applicant
ELLIOTT INDUSTRIES LIMITED

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE 55 T

2. SEARCH FEE 638 S

International search to be carried out by EP
(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

Basic Fee

The international application contains 4925 sheets.

first 30 sheets 264 b1

_____ x _____ = _____ b2

remaining sheets additional amount

Add amounts entered at b1 and b2 and enter total at B 264 B

Designation Fees

The international application contains ALL designations.

8 x 56 = 448 D

number of designation fees amount of designation fee
payable (maximum 8)

Add amounts entered at B and D and enter total at I 712 I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

4. FEE FOR PRIORITY DOCUMENT (if applicable) P

5. TOTAL FEES PAYABLE 1405

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

☐ The designation fees are not paid at this time.

MODE OF PAYMENT

☐ authorization to charge
deposit account (see below)

☒ cheque

☐ postal money order

☐ bank draft

☐ cash

☐ revenue stamps

☐ coupons

☐ other (specify):

DEPOSIT ACCOUNT AUTHORIZATION (this mode of payment may not be available at all receiving Offices)

The RO/ _____ ☐ is hereby authorized to charge the total fees indicated above to my deposit account.

☐ (this check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit) is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

☐ is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

Deposit Account No.

Date (day/month/year)

Signature

PCT

POWER OF ATTORNEY

(for an international application filed under the Patent Cooperation Treaty)

(PCT Rule 90.4)

The undersigned applicant(s) *(Names should be indicated as they appear in the request):*

PAUL MOSIER

hereby appoints (appoint) the following person as:



agent



common representative

Name and address

(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

BOULT WADE TENNANT
VERULAM GARDENS
70 GRAY'S INN ROAD
LONDON WC1X 8BT
UNITED KINGDOM

to represent the undersigned before



all the competent International Authorities



the International Searching Authority only



the International Preliminary Examining Authority only

in connection with the international application identified below:

Title of the invention: Improvements in or Related to Abrasive Flap Discs

Applicant's or agent's file reference:

52691/001

International application number (if already available):

filed with the following Office UNITED KINGDOM as receiving Office
and to make or receive payments on behalf of the undersigned.

Signature of the applicant(s) *(where there are several applicants, each of them must sign; next to each signature, indicate the name of the person signing and the capacity in which the person signs, if such capacity is not obvious from reading the request or this power):*

Date: _____

PCT

POWER OF ATTORNEY

(for an international application filed under the Patent Cooperation Treaty)

(PCT Rule 90.4)

The undersigned applicant(s) (Names should be indicated as they appear in the request):

ELLIOTT INDUSTRIES LIMITED
ELLIOTT HOUSE
VICTORIA ROAD
LONDON NW10 6NY

hereby appoints (appoint) the following person as:



agent



common representative

Name and address

(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

BOULT WADE TENNANT
VERULAM GARDENS
70 GRAY'S INN ROAD
LONDON WC1X 8BT
UNITED KINGDOM

to represent the undersigned before



all the competent International Authorities



the International Searching Authority only



the International Preliminary Examining Authority only

in connection with the international application identified below:

Title of the invention: Improvements in or Related to Abrasive Flap Discs

Applicant's or agent's file reference:

52691/001

International application number (if already available):

filed with the following Office UNITED KINGDOM as receiving Office
and to make or receive payments on behalf of the undersigned.

Signature of the applicant(s) (where there are several applicants, each of them must sign; next to each signature, indicate the name of the person signing and the capacity in which the person signs, if such capacity is not obvious from reading the request or this power):

Date: _____

PCT

POWER OF ATTORNEY

(for an international application filed under the Patent Cooperation Treaty)

(PCT Rule 90.4)

The undersigned applicant(s) (Names should be indicated as they appear in the request):

hereby appoints (appoint) the following person as:

☒ agent

☐ common representative

Name and address

(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

BOULT WADE TENNANT
VERULAM GARDENS
70 GRAY'S INN ROAD
LONDON WC1X 8BT
UNITED KINGDOM

to represent the undersigned before

☒ all the competent International Authorities

☐ the International Searching Authority only

☐ the International Preliminary Examining Authority only

in connection with the international application identified below:

Title of the invention: Improvements in or Related to Abrasive Flap Discs

Applicant's or agent's file reference: 52691/001

International application number (if already available):

filed with the following Office UNITED KINGDOM as receiving Office
and to make or receive payments on behalf of the undersigned.

Signature of the applicant(s) (where there are several applicants, each of them must sign; next to each signature, indicate the name of the person signing and the capacity in which the person signs, if such capacity is not obvious from reading the request or this power):

Date: _____

FILE

PCT

POWER OF ATTORNEY

(for an international application filed under the Patent Cooperation Treaty)

(PCT Rule 90.4)

The undersigned applicant(s) *(Names should be indicated as they appear in the request):*

PAUL MOSIER
17 LEICESTER ROAD
MEASHAM
SWADLINCOTE
DERBYS
DE12 7JG

hereby appoints (appoint) the following person as:



agent



common representative

Name and address

(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

BOULT WADE TENNANT
VERULAM GARDENS
70 GRAY'S INN ROAD
LONDON WC1X 8BT
UNITED KINGDOM

to represent the undersigned before



all the competent International Authorities



the International Searching Authority only



the International Preliminary Examining Authority only

in connection with the international application identified below:

Title of the invention: Improvements in or Related to Abrasive Flap Discs

Applicant's or agent's file reference:

52691/001

International application number (if already available):

filed with the following Office UNITED KINGDOM as receiving Office
and to make or receive payments on behalf of the undersigned.

Signature of the applicant(s) *(where there are several applicants, each of them must sign; next to each signature, indicate the name of the person signing and the capacity in which the person signs, if such capacity is not obvious from reading the request or this power);*

P. Mosier

Date:

28/3/00

PCT

FILE

POWER OF ATTORNEY

(for an international application filed under the Patent Cooperation Treaty)

(PCT Rule 90.4)

The undersigned applicant(s) (Names should be indicated as they appear in the request):

ELLIOTT INDUSTRIES LIMITED
ELLIOTT HOUSE
VICTORIA ROAD
LONDON NW10 6NY

hereby appoints (appoint) the following person as:



agent



common representative

Name and address

(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

BOULT WADE TENNANT
VERULAM GARDENS
70 GRAY'S INN ROAD
LONDON WC1X 8BT
UNITED KINGDOM

to represent the undersigned before



all the competent International Authorities



the International Searching Authority only



the International Preliminary Examining Authority only

in connection with the international application identified below:

Title of the invention: Improvements in or Related to Abrasive Flap Discs

Applicant's or agent's file reference:

52691/001

International application number (if already available):

filed with the following Office UNITED KINGDOM as receiving Office
and to make or receive payments on behalf of the undersigned.

Signature of the applicant(s) (where there are several applicants, each of them must sign; next to each signature, indicate the name of the person signing and the capacity in which the person signs, if such capacity is not obvious from reading the request or this power):



ROBIN S. JOHNSON
COMPANY SECRETARY / DIRECTOR

Date: 14 APRIL 2000

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ _____

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference SEM/52691001
International application No. PCT/GB00/01582	International filing date (day/month/year) 25/04/2000	(Earliest) Priority date (day/month/year) 23/04/1999
Title of invention IMPROVEMENTS IN OR RELATING TO ABRASIVE FLAP DISCS		
Box No. II APPLICANT(S)		
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) ELLIOTT INDUSTRIES LIMITED Elliott House Victoria Road London NW10 6NY		Telephone No.: Facsimile No.: Teleprinter No.:
State (that is, country) of nationality: United Kingdom (GB)	State (that is, country) of residence: United Kingdom (GB)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) MOSIER; Paul 17 Leicester Road Measham Swadlincote Derbyshire, DE12 7JG United Kingdom		
State (that is, country) of nationality: United Kingdom (GB)	State (that is, country) of residence: United Kingdom (GB)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) 		
State (that is, country) of nationality:	State (that is, country) of residence:	
<input type="checkbox"/> Further applicants are indicated on a continuation sheet.		

Sheet No. . . .

International application No.
PCT/GB00/01582

Continuation of Box No. II APPLICANT(S)

If none of the following sub-boxes is used, this sheet should not be included in the demand.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence:

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

State (that is, country) of nationality:

State (that is, country) of residence: .

☐

Further applicants are indicated on another continuation sheet.

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCEThe following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation.
The address must include postal code and name of country.)*BOULT WADE TENNANT
VERULAM GARDENS
70 GRAY'S INN ROAD
LONDON WC1X 8BT
UNITED KINGDOM

Telephone No.:

+44 (0)20 7430 7500

Facsimile No.:

+44 (0)20 7430 7600

Teleprinter No.:

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filedthe description ☐ as originally filed
☐ as amended under Article 34the claims ☐ as originally filed
☐ as amended under Article 19 (together with any accompanying statement)
☐ as amended under Article 34the drawings ☐ as originally filed
☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: ENGLISH☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.**Box No. V ELECTION OF STATES**The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | |
|--|---|--------|
| 1. translation of international application | : | sheets |
| 2. amendments under Article 34 | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | sheets |
| 5. letter | : | sheets |
| 6. other (<i>specify</i>) | : | sheets |

For International Preliminary Examining Authority use only

received	not received
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- | | |
|--|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet | 4. <input type="checkbox"/> statement explaining lack of signature |
| 2. <input type="checkbox"/> separate signed power of attorney | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: | 6. <input checked="" type="checkbox"/> other (<i>specify</i>): Debit Order No. 16913 |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

BOULT WADE TENNANT

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.

☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

PCT

FEE CALCULATION SHEET

Annex to the Demand for international preliminary examination

International application No. PCT/GB00/01582	Applicant's or agent's file reference SEM/MSAK/52691/001	For International Preliminary Examining Authority use only Date stamp of the IPEA							
Applicant ELLIOTT INDUSTRIES LIMITED									
Calculation of prescribed fees									
1. Preliminary examination fee 1533 EUR P									
2. Handling fee <i>(Applicants from certain States are entitled to a reduction of 75% of the handling fee. Where the applicant is (or all applicants are) so entitled, the amount to be entered at H is 25% of the handling fee.)</i> 147 EUR H									
3. Total of prescribed fees Add the amounts entered at P and H and enter total in the TOTAL box									
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 1680 </div> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> TOTAL </div>									
Mode of Payment									
<table style="width: 100%;"> <tr> <td><input type="checkbox"/> authorization to charge deposit account with the IPEA (see below)</td> <td><input type="checkbox"/> cash</td> </tr> <tr> <td><input type="checkbox"/> cheque</td> <td><input type="checkbox"/> revenue stamps</td> </tr> <tr> <td><input type="checkbox"/> postal money order</td> <td><input type="checkbox"/> coupons</td> </tr> <tr> <td><input type="checkbox"/> bank draft</td> <td><input checked="" type="checkbox"/> other (specify): Debit Order No. 16913/P</td> </tr> </table>			<input type="checkbox"/> authorization to charge deposit account with the IPEA (see below)	<input type="checkbox"/> cash	<input type="checkbox"/> cheque	<input type="checkbox"/> revenue stamps	<input type="checkbox"/> postal money order	<input type="checkbox"/> coupons	<input type="checkbox"/> bank draft
<input type="checkbox"/> authorization to charge deposit account with the IPEA (see below)	<input type="checkbox"/> cash								
<input type="checkbox"/> cheque	<input type="checkbox"/> revenue stamps								
<input type="checkbox"/> postal money order	<input type="checkbox"/> coupons								
<input type="checkbox"/> bank draft	<input checked="" type="checkbox"/> other (specify): Debit Order No. 16913/P								
Deposit Account Authorization <i>(this mode of payment may not be available at all IPEAs)</i> The IPEA/ _____ <input type="checkbox"/> is hereby authorized to charge the total fees indicated above to my deposit account. <input type="checkbox"/> <i>(this check-box may be marked only if the conditions for deposit accounts of the IPEA so permit)</i> is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.									
Deposit Account Number _____	Date (day/month/year) _____	Signature _____							

EUROPEAN PATENT OFFICE,
Erhardtstrasse 27,
D-80331 MUNICH,
GERMANY.

28 February 2001

Dear Sirs,

International Patent Application No. PCT/GB00/01582
Elliott Industries Limited
Representative's Ref: SEM/52691/001

I write in response to the Written Opinion issued on 7 February 2001 in connection with this application.

Under Item V in the Written Opinion, the Examiner indicates that claims 1 and 2 lack novelty over US 4,961,807. The Applicant respectfully disagrees with this analysis of the US document.

Claim 1 of the present application requires that the flaps are spaced from one another, at least in a radially outer region, giving each flap the freedom to flex. In the US patent, this is not the case; the flaps are pressed into contact with one another to form a traditional type of flap disc as discussed in the introductory portion of the present application and as illustrated in figures 1 and 2 of the present application. The Examiner has referred to figures 8-10 and 15-20 of the US document and it is true that at first glance figures 8, 15 and 19 in particular may appear to show a flap disc in which the flaps are spaced from one another. However, the applicant submits that this is something of an optical illusion given the fact that in perspective views as shown in these figures it is difficult to differentiate between flaps which contact one another in their overlapping regions and flaps which are actually spaced apart from one another. However, a detailed review of the manufacturing method described in the US patent shows that the flaps must be pressed into contact with one another and cannot in fact be spaced apart.

The reason for this is that in each of the embodiments described, the grinding belts 21 are pressed against the disc 1 in order to adhere the belts against the disc and, in particular, to allow a cutting device to sever the belts to form individual flaps on the disc and to provide a smooth circular perimeter. It would not be possible to cut the flaps in this way unless they were pressed firmly against one another and the disc.

contd/...

In the US patent, the first embodiment is illustrated in figures 1-10. As discussed in column 3, lines 54-60 and shown in figure 5 the ends of the grinding belts 21 are inserted between the disc 1 and a cap plate 4. An elevator 31 is lowered so that the belts 21 are captured between an edge receiver 34 and the cutting edge 33 of the cutting device 32, so that the belts 21 can be cut.

In another version of this embodiment, as discussed in column 4, lines 22-29 and shown in figure 7, a cap plate 43 is used to press the ends of the grinding belts 21 against the disc 1 by tightening a nut 45 onto a threaded shaft 42, thereby holding the belts 21 firmly so that they can be cut by cutting device 32.

The second embodiment is illustrated in figures 11-17. In particular, figure 14 shows that the grinding belts 21 are pressed against the disc 1 by the pressurising member 56 in order to allow the belts to be cut by the cutting device 32. This is described in column 5, line 60 to column 6, line 2.

The third embodiment described in the US patent is illustrated in figures 18 and 19. In this case, the means of pressing the ends of the belts 21 against the disc is not explicitly described. However, it is stated in column 6, lines 23-26 that "the belts are then cut by means of the cutting device ... in the same manner as in other preferred embodiments".

Thus, in all of the embodiments described in the US patent the ends of the grinding belts 21 are cut to produce individual flaps which are adhered to the disc and it would simply not be possible to cut the flaps in the manner shown unless they were held firmly between the disc and some other member above the disc. This means that the ends of the belts, which form the flaps, must be pressed into contact with one another and against the disc. If the flaps were more upright so that they were spaced apart from one another in the manner of the present invention, the cutting operation could not be carried out because as soon as pressure was exerted on the belts to try and cut them they would be pushed out of their upright configuration and into contact with one another. For these reasons, the applicant submits that the US patent does not disclose an abrasive flap disc as set out in claim 1 of the present application.

Regarding the objections in items VII and VIII of the Written Opinion, these matters will be dealt with when this application enters the national phase.

In view of the comments above, we ask the Examiner to reconsider his opinion and issue a favourable International Preliminary Examination Report.

Yours faithfully,

MERRIFIELD; Sarah Elizabeth
Authorised Representative

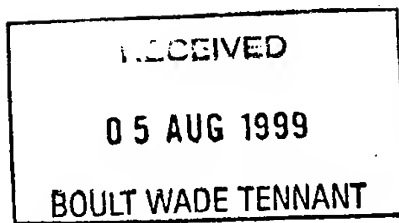


The
**Patent
Office**

10/818330
JCTO Rec'd PCT/STO 23 OCT 2001

INVESTOR IN PEOPLE

Elliot Industries Limited
% Boulton Wade Tennant
27 Furnival Street
LONDON
EC4A 1PQ



The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP9 1RH

Examiner: 01633 813592
Switchboard: 01633 814000
Fax: 01633 814444

Your Reference: SEM/MSAK/52691/0000
Application No: GB 9909468.2

3 August 1999

Dear Sirs

Patents Act 1977: Search Report under Section 17(5)

I enclose two copies of my search report and two copies of the citations.

Publication

I estimate that, provided you have met all formal requirements, preparations for publication of your application will be completed soon after **19 September 2000**. You will then receive a letter informing you of completion and telling you the publication number and date of publication.

Amendment/withdrawal

If you wish to file amended claims for inclusion with the published application, or to withdraw the application to prevent publication, you must do so before the preparations for publication are completed. **No reminder will be issued.** If you write to the Office less than 3 weeks before the above completion date, please mark your letter prominently: **"URGENT - PUBLICATION IMMINENT"**.

Yours faithfully

R.B. Luck
Examiner



Application No: GB 9909468.2
Claims searched: 1-19

Examiner: R.B. Luck
Date of search: 2 August 1999

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B3D DEP

Int Cl (Ed.6): B24D 13/04,13/06

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB2270487	Jason Inc	1 at least
X	GB2138334	J.R.Schettrumpf	1 & 2 at least
X	GB1147915	Merit Products Inc.	1 & 2 at least
X	US4872292	A.Block	1 at least
X	US3486276	A.Block	1 & 2 at least
X	EP0212062	G.Eisenblkatter	1 & 2 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference SEM/52691001	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/01582	International filing date (day/month/year) 25/04/2000	Priority date (day/month/year) 23/04/1999
International Patent Classification (IPC) or national classification and IPC B24D13/16		
Applicant ELLIOTT INDUSTRIES LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 13/10/2000	Date of completion of this report 02.08.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Antoniadis, F Telephone No. +49 89 2399 2392 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB00/01582

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-12 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB00/01582

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-17
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-17
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-17
	No:	Claims	

2. Citations and explanations
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/01582

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The nearest prior art for the subject-matter of claims 1 and 12 is described in US-A-4 961 807.

Inventive step:

The feature that each flap is substantially spaced from each adjacent flap, such that the flaps have freedom to flex.

Technical effect:

The flaps can conform to the form of the treated surface.

The dependent claims describe preferred embodiments of the invention and therefore they also meet the requirements of Art. 33 PCT.

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference SEM/52691001	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/01582	International filing date (day/month/year) 25/04/2000	Priority date (day/month/year) 23/04/1999
International Patent Classification (IPC) or national classification and IPC B24D13/16		
Applicant ELLIOTT INDUSTRIES LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 13/10/2000	Date of completion of this report 02.08.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Antoniadis, F Telephone No. +49 89 2399 2392



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB00/01582

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-12 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB00/01582

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-17
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-17
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-17
	No:	Claims	

- 2. Citations and explanations
see separate sheet**

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/01582

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The nearest prior art for the subject-matter of claims 1 and 12 is described in US-A-4 961 807.

Inventive step:

The feature that each flap is substantially spaced from each adjacent flap, such that the flaps have freedom to flex.

Technical effect:

The flaps can conform to the form of the treated surface.

The dependent claims describe preferred embodiments of the invention and therefore they also meet the requirements of Art. 33 PCT.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



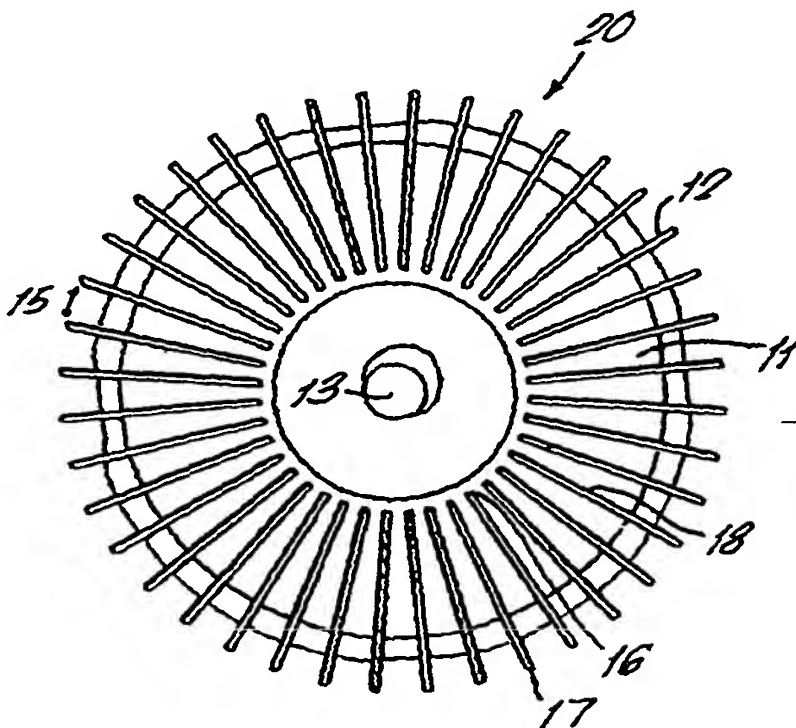
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9909468.2 23 April 1999 (23.04.1999) GB
- (71) Applicant (for all designated States except US): **ELLIOTT INDUSTRIES LIMITED** [GB/GB]; Elliott House, Victoria Road, London NW10 6NY (GB).
- (72) Inventor; and
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- (74) Agent: **BOULT WADE TENNANT**; Verulam Gardens, 70 Gray's Inn Road, London WC1X 8BT (GB).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
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- Published:
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ABRASIVE FLAP DISC



(57) Abstract: The invention relates to abrasive flap discs which are used for a variety of finishing, grinding and polishing operations, particularly on welded fabrications. The present invention provides an abrasive flap disc (20) comprising a backing plate (11), an annular array of flaps (12) of abrasive material arranged on the backing plate (11) and bonded thereto along the lower most edge of each flap (12), wherein each flap (12), at least in a radially outer region is substantially spaced from each adjacent flap (12) such that the flaps (12) have freedom to flex and conform to an underlying surface in use.

WO 01/05556 A1

10/018350

JG ac'd FCT/TC 23 OCT 2001

PCT/GB00/01582

WO 01/05556

3/11/01

ABRASIVE FLAP DISC

The invention relates to abrasive flap discs which are used for a variety of finishing, grinding and polishing operations, particularly on welded fabrications.

Generally, flap discs comprise a relatively stiff backing plate onto which abrasive flaps are adhered. The backing plate can be angled, flat, depressed, raised, or a combination of these variations. They are typically 4"-9" (10.16cm-22.86cm) in diameter, although smaller diameter discs are being introduced. The abrasives used are ordinarily 24-120 grit.

There are alternatives to flap discs, such as Depressed Centre (resin bonded) Grinding Wheels (DCGWs). However, these are only suitable for removing large amounts of material and generally can not provide suitable finishing. Thus, the use of Sanding Discs (SDs) is required subsequent to the grinding operation. Unlike these two aforementioned counterparts, flap discs are multi-purpose, this being partly attributable to the fact that the surface operation performed by them is somewhat dependent upon the pressure applied by the operator.

Furthermore, the superior properties of flap discs over DCGWs are attributable to the fact that flap discs use coated abrasives (unlike bonded abrasives for a DCGW), which inherently present the majority of the abrasive grit particles at their optimum cutting attitude whilst providing a potentially "softer" operation, removing material at a variable rate dependent upon the pressure applied and

- 2 -

contributing to an improved surface finish. Flap discs are also considered superior to SDs due to the use of multi-layer coated abrasives, which provide a substantially greater amount of useable abrasive cloth, in the region of 20:1, to provide a substantially longer life for the flap discs.

Although flap discs are "softer" than DCGWs, flap discs are still "hard", particularly when finer grit sizes are used, and as such do not lend themselves to contouring or blending work. There have been moves to develop flap discs which are "softer", but these have concentrated on providing a backing plate with reduced stiffness, e.g. Zircotex (RTM). In such cases, this has not been wholly successful as the necessary combination of a "flexible" disc and "support pad" have proved to be too rigid. Thus, the operational range of these flap discs are significantly limited. Moreover, the configuration of flap discs prevents them from being capable of dressing sharp corners.

The present invention provides an abrasive flap disc comprising a backing plate, an annular array of flaps of abrasive material arranged on the backing plate and bonded thereto along the lowermost edge of each flap, wherein each flap, at least in a radially outer region, is substantially spaced from each adjacent flap such that the flaps have freedom to flex and conform to an underlying surface in use.

Preferably, each flap does not contact an adjacent flap at all. Alternatively, each flap contacts an adjacent flap along its radially inner edge.

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Preferably, the angle between the backing plate and each flap is in the range of approximately 20° to approximately 90°. Advantageously, the angle between the backing plate and each flap is in the range of approximately 40° to approximately 70°.

In one embodiment, the abrasive flaps of the disc may be arranged such that a centerline of each flap, which extends between its radially inner and outer edges, is substantially on a radius of the backing plate.

Alternatively, the centerline of each flap may be at an angle to a radius of the backing plate. Advantageously, the angle between each flap centerline and a radius of the backing plate is in the range of approximately between 5° to approximately 85°. Most preferably, the angle between each flap centerline and a radius of the backing plate is in the range of approximately between 30° to approximately 60°.

Preferably, the flaps comprise abrasive grit bonded to a backing material and the backing plate includes means to attach the disc to a drive mechanism.

The invention further provides a method of producing an abrasive flap disc of the type described above, comprising the steps of providing a backing plate; providing an adhesive on an upper surface of the backing plate; rotating the backing plate incrementally; at each incremental step, feeding the end of a strip of abrasive material on to the adhesive on the backing plate; severing the end of the strip to form a flap; repeating the process until an annular

- 4 -

array of flaps is formed on the backing plate with each flap, at least in a radially outer region, being spaced from each adjacent flap; maintaining the flaps in the spaced position; and curing the adhesive to
5 secure the flaps to the backing plate.

Preferably, after constructing the array of flaps and before curing, the method further includes the step of placing the disc in a former adapted to
10 prevent each flap falling into substantial contact with an adjacent flap.

The former may include a cylindrical wall dimensioned to encircle the disc and prevent each flap
15 falling into substantial contact with an adjacent flap. Alternatively, a spoke-shaped frame may be placed with a spoke positioned between adjacent flaps to prevent each flap falling into substantial contact with an adjacent flap.

20 In one embodiment, the strip of abrasive material is fed such that each flap has a centerline extending from its radially inner to outer edge which is substantially on a centerline of the backing plate.

25 Alternatively, the strip of abrasive material may be fed such that each flap has a centerline extending from its radially inner to outer edge which is at an angle to a radius of the backing plate.

30 The invention therefore provides flap discs having an arrangement of abrasive flaps which give the flaps pliability and increased freedom to flex and conform to an underlying surface, thereby increasing
35 the applicability of flap discs whilst maintaining

- 5 -

sufficient support for the abrasive flaps such that the operational range of the abrasive flap discs is also maintained. Specifically, the flap disc operator can use a single tool to perform a number of
5 functions, efficiently controlling the operation performed by the pressure and angle of approach applied to the tool. Moreover, the arrangement of abrasive flaps provided is still sufficiently stiff such that the grinding of particularly rough surfaces
10 is possible. In particular, the flap discs of this invention can be used in contour and blending work, and also to dress sharp corners.

It is recognised that there are other processes
15 for the manufacture of flap discs which differ in specific ways from the normal process referred to above. However the invention is valid regardless of how the cloth and flaps are presented, cut or adhered to the backing plate.

20 The invention will now be described in detail, by way of example only, with reference to the following drawings in which :

25 Figure 1 is a plan view of a typical flap disc;

Figure 2 is a side view of the flap disc of Figure 1;

30 Figure 3 is plan view of a flap disc in accordance with one embodiment of the present invention, in which the centerlines of the abrasive flaps are aligned with radii of the backing plate;

35 Figure 4 is a side view of the flap disc of

- 6 -

Figure 3;

Figure 5 is a plan view of a flap disc in accordance with a second embodiment of the present invention, in which the centerlines of the abrasive flaps are arranged at an angle to radii of the backing plate;

Figure 6 is a side view of the flap disc of Figure 5;

Figure 7 is a plan view of a former used in the manufacturing process of the flap disc of the present invention; and

Figure 8 is a cross sectional view through the former of Figure 7 along line X-X.

As can be seen from Figures 1 and 2, current flap discs 10 comprise a backing plate 11 around the perimeter of which are arranged abrasive flaps 12. In addition, the backing plate 11 comprises a central hole 13, which is used to locate the flap disc 10 to a drive mechanism (not shown). Of course, the hole 13 can be used to locate the flap disc 10 on any suitably sized guide pin e.g. during manufacture or storage, allowing several flap discs 10 to be stacked one upon another. The backing plate 11 may comprise a projection 40 (in addition to or instead of a hole 13) on the reverse side of the backing plate 11 to allow connection to the drive mechanism.

Although the backing plate 11 is shown to be flat in Figure 2, the backing plate 11 can be a variety of shapes including inclined from the central hole 13.

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depressed or raised around the central hole 13, or some combination of these.

5 The abrasive flaps 12 themselves comprise an abrasive grit applied to a backing material such as denim. Generally, the abrasive flaps 12 are rectangular in shape and are attached along one edge to the backing plate 11 using a single epoxy adhesive 14. The abrasive flaps 12 are usually cut to size
10 from a long strip of material during manufacture of the flap disc 10.

Current practice is to apply the adhesive 14 onto the backing plate 11 over the region on which the
15 abrasive flaps 12 will be positioned. The backing plate 11 is then rotated incrementally, and at each increment the end of a long strip of abrasive material is fed at an angle onto the glued region of the backing plate 11, and the end part is then cut off to
20 form a single flap. This process is repeated until the required number of flaps 12 have been applied to the backing plate 11.

Typically, this semi-manufactured abrasive flap
25 disc 10 is then stacked upon another semi-manufactured abrasive flap disc 10. On occasion, a former may be used to separate the two semi-manufactured abrasive discs 10. The former is generally a disc of material which mirrors the contour of the required abrasive
30 face of the disc, and is used to apply a restraining pressure over part or the entire area over which the abrasive flaps 12 have been arranged. In particular, formers can be particularly useful when the outer face of the abrasive flaps 12 are required to be at a
35 different angle to the angle of the back face of the

- 8 -

backing plate 11.

The purpose of stacking the semi-manufactured
flaps discs 10 is to flatten each of the abrasive
5 flaps 12 onto one another so that the back surface of
each abrasive flap 12 rests upon the front abrasive
surface of each corresponding adjacent abrasive flap
12. Any suitable means which produce such flattened
abrasive flaps 12 can be employed e.g. not just by
10 stacking but by applying external pressure to each of
the individual flap discs 10.

Once flattened, the stack of abrasive discs 10 is
normally placed into an oven to cure the epoxy 14 such
15 that it binds the abrasive flaps 12 in the flattened
position onto the backing plates 11.

Current practice is to arrange the flaps 12 such
that their respective centerlines are aligned with
20 radii of the backing plate 11. This produces a square
hard edge which is desirable in some operations.

It is clear that, if a larger number of flaps 12
is to be applied to the flap disc 10, then the flaps
25 12 will be increasingly upright. However, the flaps
12 are always flattened as far as possible so as to
rest upon one another.

In contrast, flap discs 20 in accordance with two
30 embodiments of this invention are shown in Figures 3-
6. The flaps 12 are positioned substantially upright
such that there are significant gaps 15 between the
abrasive flaps 12. Preferably, in the abrasive flap
discs 20 of the present invention, the angle between
35 the backing plate 11 and abrasive flap 12 is between

- 9 -

20°-90°. More specifically, the angle between the backing plate 11 and abrasive flap 12 is between 40°-70°. With conventional flap discs, the angle of the flaps relative to the backing plate depends upon the number of flaps, as referred to above. With the flap discs of the present invention, however, the flaps are spaced from one another and hence the angle between the flaps and the backing plate is not dictated by the number of flaps.

Generally, each adjacent flap 12 does not rest upon its neighbour at all. However, it may be useful to arrange the flaps 12 such that adjacent flaps 12 do touch one another along their respective inner edges 16. This provides some support for the flaps 12 during curing. This contact can of course be line or point contact.

This relatively upright, open, arrangement of flaps 12 gives the flaps 12 increased flexibility, particularly at the outer periphery of the flap disc 20, and allows the flaps 12 to conform to an underlying surface in use. Thus, the operator is provided with the ability of aggressive, heavy cutting or light contour blending. It is therefore suitable to dress sharp corners, and can be used also for blending and contouring work.

As mentioned above, conventional flap discs 10 are manufactured with the flap centre line, which extends radially from the inner edge 16 to outer edge 17 of the flap 12, lying approximately on a diameter of the disc 10 (as best seen in Figure 1). In the first embodiment of the present invention, shown in Figures 3 and 4, the flaps 12 are also positioned in

- 10 -

this way.

Alternatively, in a second embodiment, shown in Figures 5 and 6, the flaps 12 are displaced such that the flap centre line lies at an angle to a radius of the disc. This helps to provide an arrangement of self supporting flaps in which the inner edge 16 of each flap rests on its neighbour. Thus, the flaps 12 of this arrangement can be cured without the need for a former (described below) to hold the flaps 12 up. Preferably, in the abrasive flap discs 20 of the current invention, the angle between the flap centerline and the radius of the backing plate is between 5°-85°. More specifically, the angle between the flap centerline and the radius of the backing plate is between 30°-60°. This feature of the invention provides an additional benefit to the product, which is the resulting generation of angle γ (see Figure 6) which provides the added facility to dress and blend sharp internal corners.

The flap discs 20 of the present invention may be manufactured using a similar process to that described above for conventional flap discs, except that adjacent flaps 12 are not flattened onto one another. Following arrangement of the appropriate number of abrasive flaps 12 onto the backing plate 11, the flaps 12 are left in a substantially upright position, spaced from one another (except perhaps along their inner edges 16). The semi-manufactured flap discs 20 may then be placed directly into ovens to cure the adhesive 14, or they may be placed in specially designed formers 30 (shown in Figures 7 and 8) to keep the abrasive flaps 12 upright and spaced apart. These formers 30 also function to enable stacking of a

- 11 -

number of flap discs 20.

The formers 30 are typically made from pressed steel or aluminium, but can be made from a variety of different materials e.g. those materials which have sufficient stiffness, which can be easily and cost effectively manufactured into the required shapes, and/or which have appropriate heat resistant and thermal expansivity properties. A particular embodiment of a former 30 is illustrated in Figures 7 and 8, and shows a former 30 having a cylindrical wall 31 dimensioned to encircle the abrasive flap discs and support the flaps.

During manufacture, the projection 40 of the backing plate 11 can be placed in the centre hole 33 of the former and thus locates the semi-manufactured flap disc 20 within the former 30. In such a position, contact between the former side wall 31 and the outer edges 17 of the flaps 12 provides support for flaps 12. In addition, the height of the side wall 31 is greater than the height of the flap disc 20 and is therefore sufficient to allow stacking of a number of semi-manufactured flap discs 20 contained within their respective formers 30. It is important that pressure must not be applied to the top edge 18 of the flaps 12 such that they become flattened. For additional support, a substantially spoke-shaped frame (not shown) could be appropriately positioned in the former 20, with spokes protruding into the gaps 15, between adjacent flaps 12, so as to support the flaps 12 during curing and prevent them falling back into contact with adjacent flaps. Formers with different configurations can be used so long as they perform the above mentioned functions.

- 12 -

In summary, the process used to produce flap discs in accordance with this invention holds the flaps up and thus provides abrasive flaps which are substantially upright, with gaps or openings between the adjacent flaps. The flap discs of the present invention are more flexible than conventional discs, enabling them to be used in contour and blending work, and also to dress into sharp corners, and thus increases the usefulness of flap discs.

10

- 13 -

CLAIMS:

1. An abrasive flap disc comprising :

a backing plate,

5 an annular array of flaps of abrasive material arranged on the backing plate and bonded thereto along the lowermost edge of each flap,

10 wherein each flap, at least in a radially outer region, is substantially spaced from each adjacent flap such that the flaps have freedom to flex and conform to an underlying surface in use.

2. An abrasive flap disc as claimed in claim 1,

15 wherein each flap does not contact an adjacent flap at all.

3. An abrasive flap disc as claimed in claim 1,

20 wherein each flap contacts an adjacent flap along its radially inner edge.

4. An abrasive flap disc as claimed in any preceding claim, wherein the angle between the backing plate and each flap is in the range of approximately 20° to approximately 90°.

25 5. An abrasive flap disc as claimed in claim 4,

wherein the angle between the backing plate and each flap is in the range of approximately 40° to approximately 70°.

30 6. An abrasive flap disc as claimed in any preceding claim, wherein a centerline of each flap, which extends between its radially inner and outer edges, is substantially on a radius of the backing plate.

- 14 -

7. An abrasive flap disc as claimed in claim 1 to 5, wherein the centerline of each flap, which extends between its radially inner and outer edges, is at an angle to a radius of the backing plate.

5

8. An abrasive flap disc as claimed in claim 7, wherein the angle between each flap centerline and a radius of the backing plate is in the range of approximately between 5° to approximately 85°.

10

9. An abrasive flap disc as claimed in claim 8, wherein the angle between each flap centerline and a radius of the backing plate is in the range of approximately between 30° to approximately 60°.

15

10. An abrasive flap disc as claimed in any preceding claim, wherein the flaps comprise abrasive grit bonded to a backing material.

20

11. An abrasive flap disc as claimed in any preceding claim, wherein the backing plate includes means to attach the disc to a drive mechanism.

25

12. A method of producing an abrasive flap disc of the type set out in claim 1, comprising the steps of :
providing a backing plate;

providing an adhesive on an upper surface of the backing plate;

rotating the backing plate incrementally;

30

at each incremental step, feeding the end of a strip of abrasive material on to the adhesive on the backing plate;

severing the end of the strip to form a flap;

repeating the process until an annular array of

35

flaps is formed on the backing plate with each flap

- 15 -

at least in a radially outer region, being spaced from each adjacent flap;

maintaining the flaps in spaced positioned; and

5 curing the adhesive to secure the flaps to the backing plate.

13. A method of producing an abrasive flap disc as claimed in claim 12, wherein after constructing the array of flaps and before curing, the method further
10 includes the step of placing the disc in a former adapted to prevent each flap falling into substantial contact with an adjacent flap.

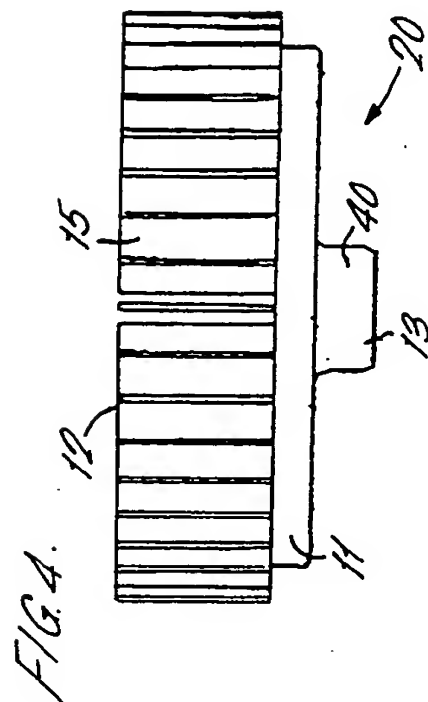
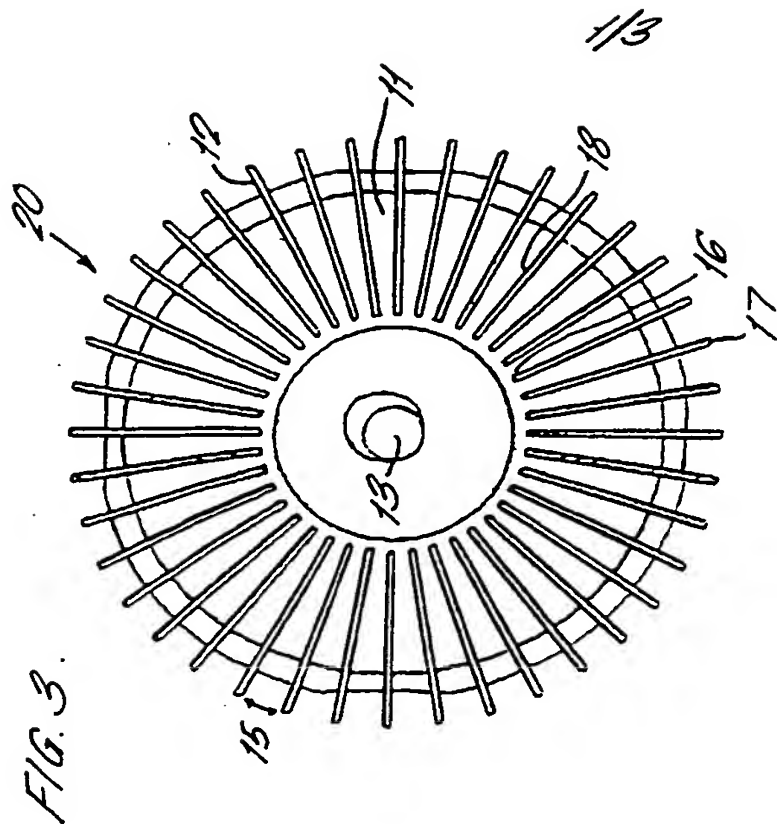
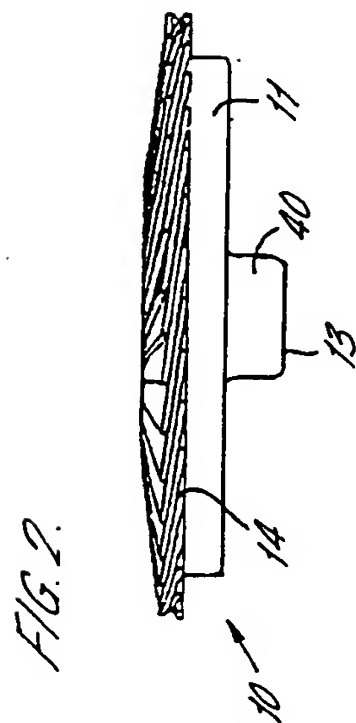
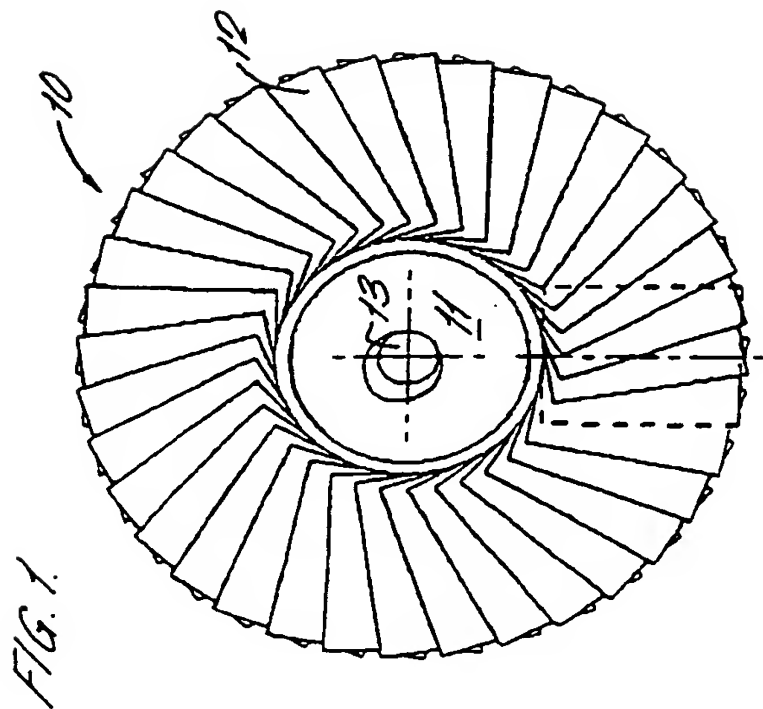
14. A method of producing an abrasive flap disc as
15 claimed in claim 13, wherein the former includes a cylindrical wall dimensioned to encircle the disc and prevent each flap falling substantial contact with an adjacent flap.

20 15. A method of producing an abrasive flap disc as claimed in claims 13 or 14, wherein a spoke-shaped frame is placed with a spoke positioned between adjacent flaps to prevent each flap falling into substantial contact with an adjacent flap.

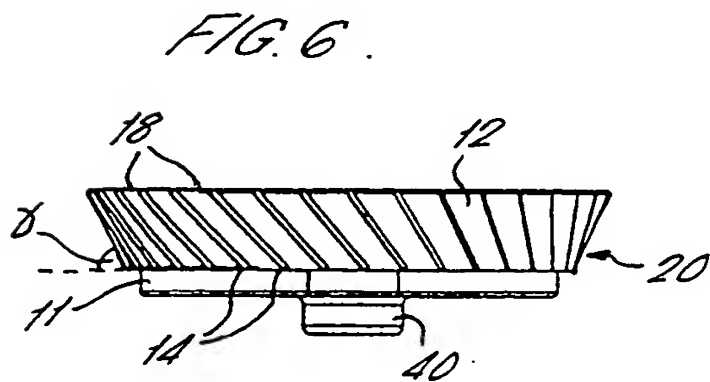
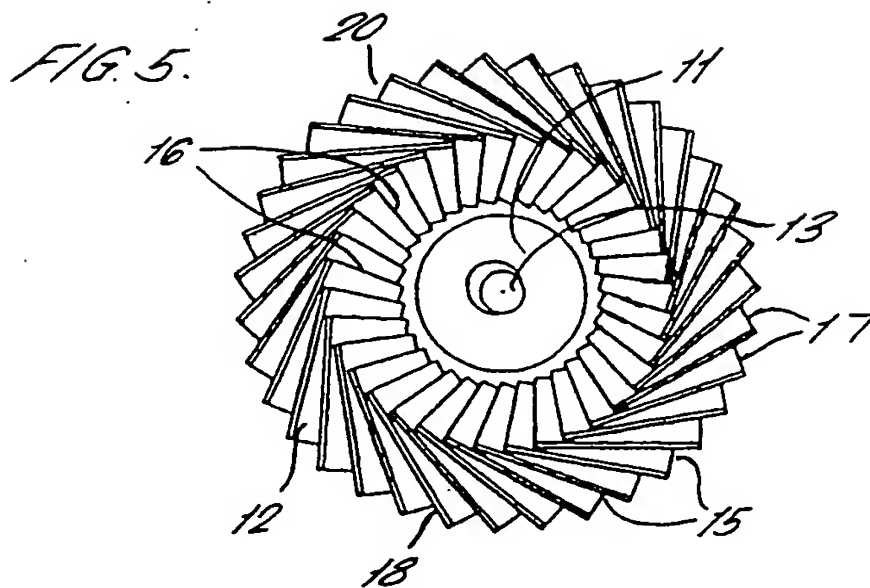
25 16. A method of producing an abrasive flap disc as claimed in any of claims 12 to 15, comprising the step of feeding the strip of abrasive material such that each flap has a centerline extending from its radially
30 inner to outer edge which is substantially on a centerline of the backing plate.

17. A method of producing an abrasive flap disc as claimed in any of claims 12 to 15, comprising the step
35 of feeding the strip of abrasive material such that

each flap has a centerline extending from its radially inner to outer edge which is at an angle to a radius of the backing plate.



2/3



3/3

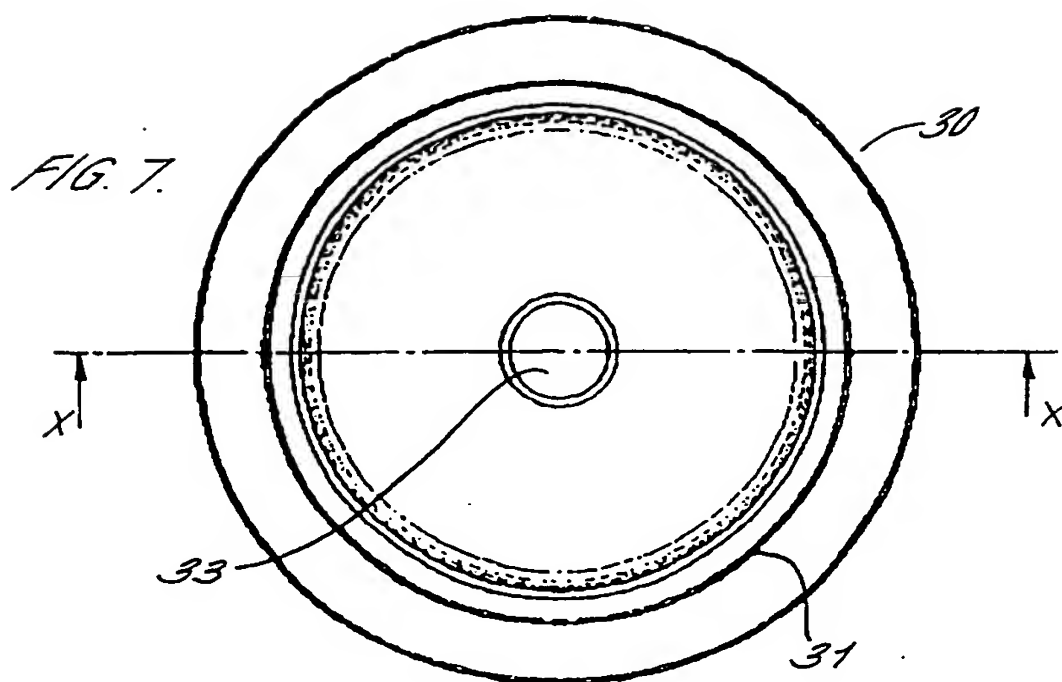
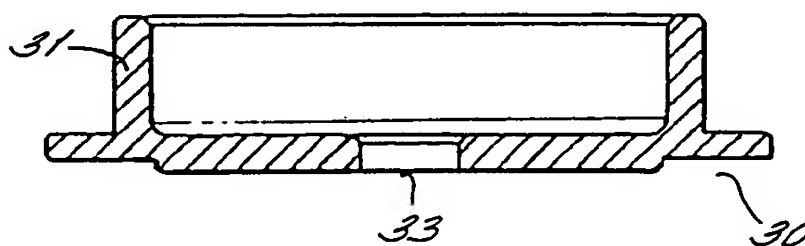


FIG. 8.



PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference SEM/52691001	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 01582	International filing date (day/month/year) 25/04/2000	(Earliest) Priority Date (day/month/year) 23/04/1999
Applicant ELLIOTT INDUSTRIES LIMITED et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

ABRASIVE FLAP DISC

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

3

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

Inter national Application No

PCT/GB 00/01582

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B24D13/16 B24D18/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B24D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 127 897 A (UEMATSU YOSHINORI) 13 October 1972 (1972-10-13) page 5, line 23 -page 6, line 6; figures	1-5, 7-15,17
X	US 1 654 275 A (N.A. STRAND) 27 December 1927 (1927-12-27) page 1, line 34 - line 66; figures	1,2,6,11
A	US 4 961 807 A (ICHIGUCHI HIROKAZU) 9 October 1990 (1990-10-09) column 2, line 40 -column 4, line 47	1,10-13, 16,17

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

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